

MATH 022

NAME _____

EXAM II

STUDENT NUMBER _____

SPRING 2012

INSTRUCTOR _____

VERSION A

SECTION NUMBER _____

On your scantron, write and bubble your PSU ID, Section Number, and Test Version. Failure to correctly code these items may result in a loss of 5 points on the exam.

On your scantron, bubble letters corresponding to your answers on indicated questions. It is a good idea for future review to circle your answers in the test booklet.

Check that your exam contains 20 questions numbered sequentially.

Answer Questions 1-20 on your scantron.

Each multiple choice question is worth 5 points.

THE USE OF A CALCULATOR, CELL PHONE, OR ANY
OTHER ELECTRONIC DEVICE IS NOT PERMITTED IN THIS
EXAMINATION.

THE USE OF NOTES OF ANY KIND IS NOT PERMITTED
DURING THIS EXAMINATION.

1. Which of the following is a one-to-one function?

a) $f(x) = 3x - 1$

b) $f(x) = 2x^2$

c) $f(x) = -2x^4$

d) $f(x) = 3|x|$

e) $f(x) = (x - 1)^2$

2. Find the inverse function of $f(x) = \sqrt[3]{2x + 1}$.

a) $f^{-1}(x) = \sqrt[3]{\frac{x}{2} - 1}$

b) $f^{-1}(x) = \frac{x^3 - 1}{2}$

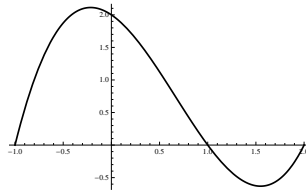
c) $f^{-1}(x) = x^3 - 1$

d) $f^{-1}(x) = 2x^3 + 1$

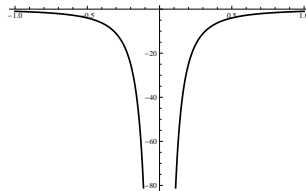
e) $f^{-1}(x) = \frac{1}{\sqrt[3]{2x + 1}}$

3. Which of the following graphs represents a one-to-one function of x ?

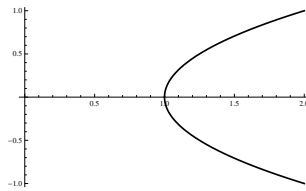
a)



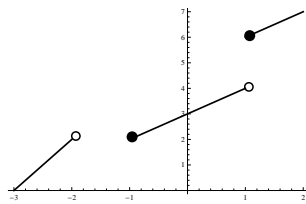
b)



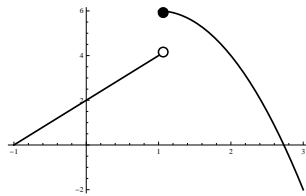
c)



d)



e)



4. What is the range of the function $f(x) = \frac{x+3}{x-2}$? (Hint: Inverse function)

- a) $(-\infty, \infty)$
- b) $(-\infty, -2) \cup (-2, \infty)$
- c) $(-\infty, 2) \cup (2, \infty)$
- d) $(-\infty, 1) \cup (1, \infty)$
- e) $(-\infty, 0) \cup (0, \infty)$

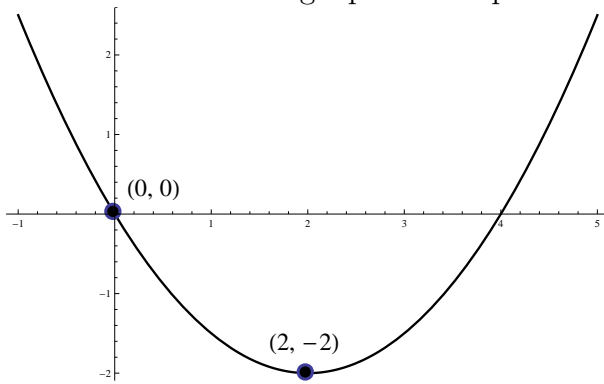
5. Find the vertex of the graph of $f(x) = -3(x+2)^2 - 4$.

- a) $(-3, 2)$
- b) $(2, 4)$
- c) $(-3, 4)$
- d) $(2, -4)$
- e) $(-2, -4)$

6. Write the function $f(x) = 3x^2 - 12x + 11$ in the standard form $f(x) = a(x-h)^2 + k$.

- a) $(3x-2)^2 + 7$
- b) $3(x-2)^2 + 11$
- c) $3(x-2)^2 - 1$
- d) $3(x+2)^2 + 7$
- e) $3(x+2)^2 - 12$

7. Which of the following equations represents the graph below?



- a) $f(x) = x^2 + 2x - 2$
- b) $f(x) = \frac{1}{2}(x - 2)^2 - 2$
- c) $f(x) = (x - 2)^2 - 2$
- d) $f(x) = \frac{1}{2}(x + 2)^2 + 2$
- e) $f(x) = 2(x - 2)^2 + 2$

8. Find the x - and y -intercepts of the graph of $f(x) = x^2 + 3x - 4$.

- a) (0, 0)
- b) (-4, 0), (1, 0)
- c) (1, 0), (0, 1), (0, 0)
- d) (0, -4), (-4, 0)
- e) (-4, 0), (1, 0), (0, -4)

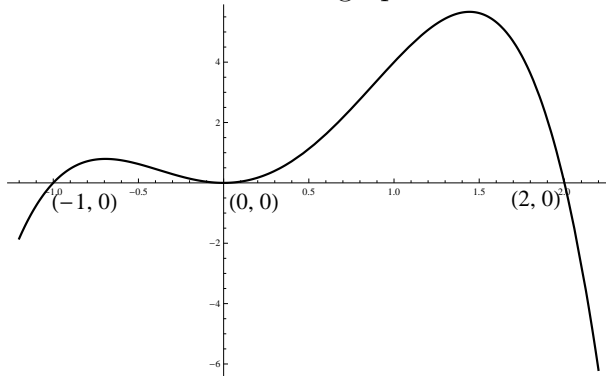
9. The height of an object after t seconds (in feet) with initial height h_0 and initial velocity v_0 is given by

$$h(t) = -16t^2 + v_0t + h_0.$$

If you drop a ball with no initial velocity from a height of 1600 feet, how long will it fall before it hits the ground?

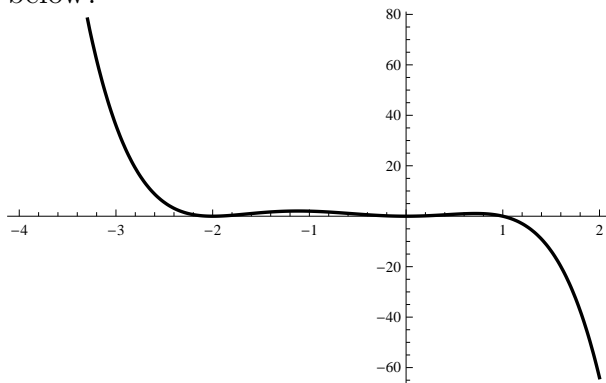
- a) 5 seconds
 - b) 10 seconds
 - c) 20 seconds
 - d) 49 seconds
 - e) 100 seconds
10. Pollyanna wishes to fence in a rectangular area along a river. She only needs 3 sides of fencing, as the river will provide the fourth side. If she has 20 total feet of fencing, what is the largest area she can enclose?
- a) 5 square feet
 - b) 25 square feet
 - c) 50 square feet
 - d) 75 square feet
 - e) 100 square feet
11. Which of the following is true of the graph of $f(x) = x^3 + 2x^2 - 4x - 8$?
- a) The graph touches the x -axis at $x = 2$
 - b) The graph touches the x -axis at $x = -2$
 - c) The graph crosses the x -axis at $x = -1$
 - d) The graph touches the x -axis at $x = 1$
 - e) The graph crosses the x -axis at $x = 4$

12. Which function has the graph below?



- a) $f(x) = 3x^2(x + 1)(x - 2)$
- b) $g(x) = -x^2(x - 1)(x + 2)$
- c) $h(x) = x(x + 1)^2(x - 2)^2$
- d) $r(x) = -x(x - 1)^2(x - 2)$
- e) $s(x) = -2x^2(x + 1)(x - 2)$

13. What can be said about the degree and leading coefficient of the polynomial whose graph is below?



- a) Odd degree, negative leading coefficient
- b) Odd degree, positive leading coefficient
- c) Even degree, negative leading coefficient
- d) Even degree, positive leading coefficient
- e) Negative leading coefficient, degree could be either even or odd

14. What is the remainder when we divide $f(x) = x^3 - 3x^2 + x - 5$ by $(x - 2)$?

- a) 1
- b) -3
- c) -7
- d) -11
- e) 0

15. Which of the following is a factor of $f(x) = 2x^3 - 5x^2 + 7x - 4$?

- a) x
- b) $x - 1$
- c) $x - 2$
- d) $x - 3$
- e) $x - 4$

16. If $c = 1$ is a zero of $f(x) = x^3 + 2x^2 - x - 2$, give the remaining zeroes of $f(x)$.

- a) $\{1, 2\}$
- b) $\{-1, -2\}$
- c) $\{0, -1\}$
- d) $\{0\}$
- e) $\{-1\}$

17. Find the x -intercepts of $f(x) = \frac{x^2 - 9}{x + 9}$.

- a) $x = 1$
- b) $x = -1$
- c) $x = -5$
- d) $x = -3, x = 3$
- e) There are no x -intercepts.

18. Find all asymptotes of $f(x) = \frac{x + 3}{x^2 - 9}$

- a) Vertical: $x = -3, x = 3$; No Horizontal
- b) Vertical: $x = -3, x = 3$; Horizontal: $y = 0$
- c) Vertical: $x = 3$; Horizontal: $y = 0$
- d) Vertical: $x = 3$; Horizontal: $y = 1$
- e) Vertical: $x = -3$; No Horizontal

19. The graph of $f(x) = \frac{1}{(x - 5)^2} + 4$ is obtained from the graph of $y = \frac{1}{x^2}$ by shifting:

- a) 5 units left, 4 units up
- b) 5 units left, 4 units down
- c) 5 units right, 4 units up
- d) 5 units right, 4 units down
- e) None of the above

20. The rational function $f(x) = \frac{x^2 + 5x + 6}{x + 3}$ has:

- a) A vertical asymptote at $x = -3$
- b) A horizontal asymptote at $y = 0$
- c) A horizontal asymptote at $y = 1$
- d) A removable discontinuity (hole) at $x = -3$
- e) A removable discontinuity (hole) at $x = -2$